

Science - 4th Grade-Water Cycle!!

Time: 45 minutes.

Group Size: Small (4-5)

Summary:

Students will filter water with fabric, paper towel, and sand and see what water gets the cleanest and which filter works the fastest. Students should see that sand is an effective filter and water is naturally filtered like this.

Materials:

1 funnel per group

paper towels

sand

fabric (t-shirt scraps work)

2 jars per group

dirty water

food coloring (optional)

Background For Teachers:

Water filtration works by passing unclean water through small pores that catch the particles suspended in the water. If the pore size is too large, only the largest particles are filtered out. But the filter works very fast. If the pore size is very small, the water is filtered very well but it takes a long time. Note that water filtered in these experiments is not potable: bacteria, viruses, and chemicals may still exist.

Student Prior Knowledge:

Not all water is drinkable.

Learning Outcomes:

1. Use science process and thinking skills.
2. Manifest science interests and attitudes.
3. Understand important science concepts and principles.

4. Communicate effectively using science language and reasoning.
5. Demonstrate awareness of the social and historical aspects of science.
6. Understand the nature of science.

Instructional Procedures:

(Before Lesson)

You will need to make some murky water ahead of time. Take a pint jar and fill it half way with dirt. Run water over the dirt to float off the sticks, roots, and any other large debris. Once those have been removed, fill the jar with water (it should still be very cloudy) and pour just the water into a 1 quart clean container. Repeat until you fill the 1 quart jar. The jar should contain mostly murky water with just a little bit of settled silts and clays. This water can be homogenized (shaken) and split into separate jars for each group.

(Lesson)

Begin the lesson with a comparison between river water and spring water. River water is murky with a lot of suspended particles while spring water is generally crystal clean. Pose the question of why one water is dirty, and the other is clean. Explain that filtration by rocks and sediments removes all of the particles.

Through experimentation students will see what acts as a better filter: fabric, paper towels, or sand.

(Setup)

Fabric: place the fabric in the funnel and put the funnel in the jar. Shake up a jar of murky water and pour in, being careful to not overflow the funnel.

Paper towel: fold the paper towel in quarters and open one fold create a cone shaped filter. Place the filter in the funnel and add shaken murky water. Again, being careful to not over-flow the funnel.

Sand: the sand needs a paper towel filter to prevent the sand from being washed into the jar. Fill the paper towel filter about half-way with sand. Add shaken murky water being careful not to overflow the funnel.

Students will see that fabric is fast and works poorly, paper towel is slower but works better and sand is very slow but works very well. If time is available, let the paper towel and fabric teams re-filter their water to see if it gets cleaner the second time.

Extensions:

Chemical filters: Ask students if they think these filters will remove chemicals in the water. Even if they say no, they will be eager to add food coloring to their filter to see what happens. Add 1-2 drops of food coloring to a small cup of clean water and add to the filter set up (you could use new pieces of fabric, paper towels, and sand but it is not necessary). Make sure the students note the color saturation of the water before adding it. The students should see that some color is absorbed by the filters but in general blue water in = blue water out.

Combined filter systems: With extra supplies (including paper, aluminum foil, sponges) allow students to create their own filter design. They should be designing for speed and efficiency. One suggestion is the sand filter with a fabric pre-filter.

Bibliography:

Fun With Filters - Naked Scientist

<http://www.thenakedscientists.com/HTML/content/kitchenscience/exp/fun-with-filters/>